

# Alessandro Casa

## CONTACT INFORMATION

🎓 Department of Economics, University of Bergamo  
Via dei Caniana 2, 24127 Bergamo, Italy  
Office: 266

✉ alessandro.casa@unibg.it

🌐 AlessandroCasa

🔗 alessandrocasa.github.io

🏠 0000-0002-2929-3850

## RESEARCH INTERESTS

Latent variable models; Nonparametric statistics; Clustering; Density estimation; Computational statistics; Dimensionality reduction techniques; Graphical models; Chemometrics; Bayesian statistics.

## CURRENT POSITION

**Senior Assistant Professor of Statistics** (RTDb - tenure track) since Feb. 2024  
Department of Economics, University of Bergamo  
Ricercatore SECS-S/01

## PAST POSITIONS

**Junior Assistant Professor of Statistics** (RTDa) Jan. 2022 - Jan. 2024  
Faculty of Economics and Management, Free University of Bozen-Bolzano  
Ricercatore SECS-S/01

**Postdoctoral research fellow** (Level 2) Nov. 2021 - Dec 2021  
School of Mathematics and Statistics, University College Dublin  
Affiliated with: Vistamilk SFI Research Centre  
Insight SFI Research Centre for Data Analytics  
Supervisor: Prof. T.B. Murphy

**Postdoctoral research fellow** (Level 1) Mar. 2020 - Oct 2021  
School of Mathematics and Statistics, University College Dublin  
Affiliated with: Vistamilk SFI Research Centre  
Insight SFI Research Centre for Data Analytics  
Supervisor: Prof. T.B. Murphy

**Research Assistant Pending Viva** Nov. 2019 - Feb. 2020  
School of Mathematics and Statistics, University College Dublin  
Affiliated with: Vistamilk SFI Research Centre  
Insight SFI Research Centre for Data Analytics

## AWARDS, ASN, SCHOLARSHIPS

- National Qualification for Associate Professor (ASN II fascia) in Statistics (SC 13/D1) Jun. 2023
- “*PhD Student/Young Researcher Paper Award for outstanding contribution to the field of Classification, Clustering and Data Analysis*” at the 14th Scientific Meeting of the Classification and Data Analysis Group Sept. 2023
- “*Best contribution by a young researcher*” at the 51st meeting of the Italian Statistical Society Sept. 2022
- Doctoral Scholarship granted by University of Padova 2016-2019

## EDUCATION

**Ph.D. in Statistics** Oct. 2016 - Feb. 2020  
University of Padova  
Thesis: *Climbing modes and exploring mixtures: a journey in density-based clustering*  
Supervisor: Prof. G. Menardi and Prof. J.E.Chacòn (co-supervisor)

<b>Master degree in Statistical Sciences</b> University of Padova Final grade: 110/110 cum laude Thesis: <i>Semi-supervised detection of collective anomalies using non-parametric methods with an application to particle physics</i> (written in italian) Supervisor: Prof. G. Menardi	Oct. 2014 - Sept. 2016
<b>Bachelor degree in Statistics, Economics and Finance</b> University of Padova Final grade: 110/110 cum laude Thesis: <i>Dimension reduction for model-based clustering: a simulation study and an application to genetic data</i> (written in italian) Supervisor: Prof. G. Menardi	Oct. 2011 - July 2014

**VISITING PERIODS**

**During the Ph.D. program**

- University of Cote d'Azur, Laboratory J.A. Dieudonné. Visiting scholar under the supervision of Prof. C. Bouveyron (Oct. 2018 - Dec. 2018)
- University of Perugia, Department of Economics. Visiting scholar under the supervision of Prof. L. Scrucca (Apr. 2018)
- University of Cambridge, Department of Pure mathematics and Mathematical Sciences. Visiting scholar under the supervision of Prof. R. Samworth (Oct. 2017 - Dec. 2017)

**CONFERENCES PRESENTATIONS**

**Seminars**

- Brown bag seminar  
Università degli Studi di Bergamo (Mar. 2024)
- Mathematics for Data Science, AI and ML Seminar Series  
Università di Trento (May 2023)
- Working Group on Statistical Learning  
University College Dublin (Feb. 2023)
- Statistics Seminar series  
Trinity College Dublin - Online (Feb. 2022)
- Working Group on Statistical Learning  
University College Dublin - Online (Feb. 2021)
- Vistamilk Spectroscopy Research Meeting  
Online (Jul. 2020)
- Working Group on Statistical Learning  
University College Dublin (Feb. 2020)

**Invited talk**

- Working Group on Model-Based Clustering  
Bertinoro (FC), University of Bologna (Jul. 2024)
- SIS - 52nd Scientific meeting of the Italian Statistical Society  
Bari (Jun. 2024)
- CLADAG - Classification and Data Analysis Group 2023  
Salerno (Sept. 2023)
- Working Group on Model-Based Clustering  
Pittsburgh, Carnegie Mellon University (Jul. 2023)
- Workshop on Statistical Learning and Econometrics  
Bolzano (Dec. 2022)
- CMStatistics 2022 - 15th ERCIM WG  
London (Dec. 2022)

- Vistamilk Science Foundation Ireland Site Review  
Online (Sept. 2022)
- ECDA - European Conference on Data Analysis  
Naples (Sept. 2022)
- COMPSTAT 2022  
Bologna (Aug. 2022)
- SIS - 51st Scientific meeting of the Italian Statistical Society  
Caserta (Jun. 2022)
- CMStatistics 2021 - 14th ERCIM WG  
Online (Dec. 2021)
- Vistamilk Annual Conference  
Online (Mar. 2021)
- Vistamilk Science Foundation Ireland Site Review  
Online (Oct. 2020)
- CLADAG - Classification and Data Analysis Group 2019  
Cassino (Sept. 2019)
- EMS - European Meeting of Statisticians  
Palermo (Jul. 2019)

#### **Contributed talk and Poster presentations**

- Working Group on Model-Based Clustering  
Athens (Oct. 2021)
- CLADAG - Classification and Data Analysis Group 2021  
Online (Sept. 2021)
- SIS - 50th Scientific meeting of the Italian Statistical Society  
Online (Jun. 2021)
- CASI - 41st Conference on Applied Statistics in Ireland  
Online (May 2021)
- Working Group on Model-Based Clustering  
Wien (Jul. 2019)
- ASPD - Workshop on Advanced Statistics for Physics Discovery  
Padova (Sept. 2018)
- MBC2 - Model-Based Clustering and Classification  
Catania (Sept. 2018)
- ECDA - European Conference on Data Analysis  
Paderborn (Jul. 2018)
- SIS - 49th Scientific meeting of the Italian Statistical Society  
Palermo (Jun. 2018)
- ISNPS - International Society for Nonparametric Statistics  
Salerno (Jun. 2018)
- SIS - Intermediate conference of the Italian Statistical Society  
Florence (Jun. 2017)

#### **Chair and discussant**

- SIS - 52nd Scientific meeting of the Italian Statistical Society, Bari  
Session "Advanced statistical methods to analyze complex data" (Jun. 2024)
- Chair of several sessions at the *Vistamilk Science Foundation Ireland Site Review* and  
at the *International Workshop on Spectroscopy and Chemometrics*

## TEACHING AND SUPERVISION

### Teaching Experience

#### University of Bergamo

- Statistics - Lecturer (in italian)  
BSc in Ingegneria Meccanica, Academic year, 2023/2024 (48hrs)

#### Free university of Bozen-Bolzano

- Statistics for Tourism, Sports and Event Management - Teaching assistant (in italian)  
BSc in Tourism, Sports and Event Management, Academic year 2023/2024 (18hrs)
- High-dimensional Econometric Methods for Big Data - Lecturer (in english)  
PhD in Economics and Finance, Academic year 2022/2023 (8 hrs)
- Statistical Methods for Business Analysis - Lecturer (in english)  
MSc in Entrepreneurship and Innovation, Academic year 2022/2023 (54hrs)
- Statistics for Tourism, Sports and Event Management - Teaching assistant (in italian)  
BSc in Tourism, Sports and Event Management, Academic year 2022/2023 (18hrs)
- Statistics - Teaching assistant (in italian)  
BSc in Economics and Management, Academic year 2022/2023 (18hrs)
- Statistical Methods for Business Analysis - Lecturer (in english)  
MSc in Entrepreneurship and Innovation, Academic year 2021/2022 (52hrs)

#### University College Dublin

- STAT20060 - Statistics & Probability - Lecturer  
Level 2, Academic year 2019/2020.
- STAT30270 - Statistical Machine Learning - Teaching assistant  
Level 3, Academic year 2019/2020.
- STAT20060 Statistics & Probability - Teaching assistant  
Level 2, Academic year 2019/2020.

#### University of Padova

- *Bike sharing in Paris: a case study* (in italian).  
Specialist lecture during the class Statistica Iterazione  
Master degree, Academic year 2018/19.

### Supervising Experience

#### Politecnico di Milano

- MSc in Mathematical Engineering  
Jacopo Gardella (co-supervisor, main supervisors: A. Pini and R. Argiento, 2024)
- MSc in Mathematical Engineering  
Elisa Borrini (co-supervisor, main supervisor: A. Cappozzo, 2024)

#### Free University of Bozen-Bolzano

- MSc in Entrepreneurship and Innovation  
Isabel Franchini (main supervisor, 2023), David Bottai (co-supervisor, main supervisor: A. Narduzzo, 2023)

#### University of Padova

- MSc in Statistical Science  
Giulia Pascali (co-supervisor, main supervisor: G. Menardi, 2019)

## RESEARCH PROJECTS

### Participation to research projects

- “Analisi di dati ad alta dimensionalità per processi decisionali sostenibili” (CUP I51B21004310005). Scientific supervisor: Prof. Davide Ferrari  
Position: Member of the research group (Jan. 2022 - Jan. 2024)
- “Insight Science Foundation Ireland Research Centre for Data Analytics” (ref. no. SFI/12/RC/2289.P2). Scientific supervisor: Prof. Thomas Brendan Murphy  
Position: Member of the research group (November 2019 – December 2021)

- Vistamilk - Research grant from Science Foundation Ireland and the Department of Agriculture, Food and Marine on behalf of the Government of Ireland (grant 16/RC/3835). Scientific supervisor: Prof. Thomas Brendan Murphy  
Position: Member of the research group (November 2019 – December 2021)
- “Approfondimenti su metodi di clustering basati sulla densità”. Scientific Research Project DOR (prot. DOR1944143). PI: Prof. Giovanna Menardi  
Position: Member of the research group (2019)
- “Bandwidth selection in nonparametric density estimation for clustering purposes”. Scientific Research Project DOR (prot. DOR1898215). PI: Prof. Giovanna Menardi  
Position: Member of the research group (2018)
- “AMVA4NP - Advanced Multivariate Analysis for New Physics Searches at the Large Hadron Collider”, Marie Skłodowska Curie - Innovative Training Network (Horizon 2020). Scientific supervisor: Prof. Giovanna Menardi  
Position: Member of the research group (2016-2019)

#### EDITORIAL ACTIVITY

##### Referee for (alphabetically ordered)

- Advances in Data Analysis and Classification, Annals of Applied Statistics, Canadian Journal of Statistics, Computational Statistics and Data Analysis, Electronic Journal of Statistics, Food Analytical Methods, Journal of Classification, Journal of Computational and Graphical Statistics, Journal of Dairy Science, Journal of Royal Statistical Society: Series C, Journal of Statistical Software, Knowledge-based Systems, Mathematics, New England Journal of Statistics in Data Science, R Journal, Scientific Reports, Social Indicators Research, Stat, Statistical Analysis and Data Mining, Statistics and Computing, Statistics in Medicine, WIREs Computational Statistics.

#### ORGANIZATION OF SCIENTIFIC EVENTS

- Member of the organizing committee of the fourth edition of the *International Workshop on Spectroscopy and Chemometrics* (Fermoy, April 2024)
- Member of the organizing committee of the “*Workshop on statistical learning and econometrics - Methodological advancements and applications*” (Bolzano, December 2022)
- Member of the organizing committee of the second edition of the *International Workshop on Spectroscopy and Chemometrics* (Dublin, April 2022)
- Academic Lead of the organizing committee of the inaugural edition of the *International Workshop on Spectroscopy and Chemometrics* (Online, April 2021)
- Member of the organizing committee of the monthly Vistamilk Spectroscopy research meetings (July 2020 - now)

#### INSTITUTIONAL ACTIVITIES

##### Membership to scientific societies

- Società Italiana di Statistica (SIS) and young Italian Statistical Society (ySIS)
- Irish Statistical Association (ISA) and young Irish Statistical Association (yISA)
- Research Group for Statistical Applications to Environmental Problems (GRASPA)
- Classification and Data Analysis Group (CLADAG)

##### Service to university

- Member of the Admission Board to the Master Degree Programme in “Data Analytics for Economics and Management” (Academic year 2023/2024)
- Member of the selection committee regarding evaluation and ranking of the applications concerning Teaching contract, Lecturing assistant and Teaching assistant positions. Free University of Bozen-Bolzano (Jan 2022 – Jan 2024)
- Elected representative of Ph.D. students and Postdoctoral researchers in the Faculty Board. University of Padova (2016–2020)
- Elected representative of Ph.D. students in the Doctoral Board of the Grad School. University of Padova (2016-2019)

### Outreach Events

- Organising committee of the Math & Stats area at “Le Mille e una scienza”, a science festival in Bolzano specifically focused for the youths (Nov 2022 and Nov 2023)
- Took part to “I’m a scientist - Get me out of here”, event in Ireland connecting school students with scientists (Nov 2020)
- Notte europea dei ricercatori - University of Padova (Sept 2016 & Sept 2019)

### EVENTS

- Start Up Research - Follow up Jun. 2018  
Follow up meeting where the research groups present and discuss the scientific output of their works after one year of research
- Start Up research Jun. 2017  
Meeting where small research groups of young scholars, advised by senior researchers, are asked to develop innovative methods and models to analyze a common dataset
- Stats Under the Stars 3 Jun. 2017  
Organizers: University of Florence, Italian Statistical Society
- Stats Under the Stars 1 Sept. 2015  
Organizers: University of Padova, Italian Statistical Society
- Data Science Game Jun. 2015  
Organizers: Google, Capgemini

### COMPUTER AND LANGUAGE SKILLS

#### Computer skills

- OS and Applications: Mac OS, Microsoft Windows, Linux, OpenOffice
- Programming languages: R (advanced), Python, SQL, Stata, SAS, C/C++
- Markup:  $\text{\LaTeX}$ , HTML, Markdown

#### Language skills

- Italian: mother tongue
- English: C1  
(Certificate of the Language center of the Free University of Bozen-Bolzano)
- German: A2  
(Goethe zertifikat)

### PUBLICATIONS

#### Submitted preprints

- **Casa, A.**, Ferrari, D. & Huang, Z. (2024+)  
*High-dimensional covariance estimation by pairwise likelihood truncation*  
arXiv:2407.07717
- Cappozzo, A., **Casa, A.** & Fop, M. (2024+)  
*Sparse model-based clustering of three-way data via lasso-type penalties*  
arXiv:2307.10673
- Ferraccioli, F., **Casa, A.** & Stefanucci, M. (2024+)  
*An adaptive functional regression framework for spatially heterogeneous signals in spectroscopy*  
arXiv:2309.06999

#### Articles in refereed journals

- Frizzarin, M., Visentin, G., Ferragina, A., Hayes, E., Bevilacqua, A., Dhariyal, B., Domijan, K., Khan, H., Ifrim, G., Le Nguyen, T., Meagher, J., Menchetti, L., Singh, A., Whoriskey, S., Williamson, R., Zappaterra, M. & **Casa, A.** (2023)  
*Classification of cow diet based on milk mid infrared spectra: a data analysis competition at the “International workshop on spectroscopy and chemometrics 2022”*  
Chemometrics and Intelligent Laboratory Systems, 104755
- **Casa, A.**, Cappozzo, A. & Fop, M. (2022)  
*Group-wise shrinkage estimation in penalized model-based clustering*  
Journal of Classification, 39(3), 648-674

- **Casa, A.**, O’Callaghan, T.F. & Murphy, T.B. (2022)  
*Parsimonious Bayesian Factor Analysis for modelling latent structure in spectroscopy data.*  
The Annals of Applied Statistics, 16(4), 2417–2436
- **Casa, A.** & Menardi, G. (2021)  
*Nonparametric semi-supervised classification with application to signal detection in high energy physics.*  
Statistical Methods & Applications, 31(3), 531–550
- Frizzarin, M., Gormley, I.C., **Casa, A.** & McParland, S. (2021)  
*Selecting milk spectra to develop equations to predict milk technological traits*  
Foods, 10(12), 3084
- Stakia, A., Dorigo, T., Banelli, G., Bortoletto, D., **Casa, A.**, de Castro, P., Delaere, C., Donini, J., Finos, L., Gallinaro, M., Giammanco, A., Held, A., Jimenez Morales, F., Kotkowski, G., Liew, S.P., Maltoni, F., Menardi, G., Papavergou, I., Saggio, A., Scarpa, B., Strong, G.C., Tosciri, C., Varela, J., Vischia, P. & Weiler, A. (2021)  
*Advanced multi-variate analysis methods for new physics searches at the Large Hadron Collider*  
Reviews in Physics, 7, 100063.
- Frizzarin, M., Bevilacqua, A., Dhariyal, B., Domijan, K., Ferraccioli, F., Hayes, E., Ifrim, G., Konkolewska, A., Le Nguyen, T., Mbaka, U., Ranzato, G., Singh, A., Stefanucci, M. & **Casa, A.** (2021).  
*Mid infrared spectroscopy and milk quality traits: a data analysis competition at the “International Workshop on Spectroscopy and Chemometrics 2021”*  
Chemometrics and Intelligent Laboratory Systems, 219, 10442
- **Casa, A.**, Bouveyron, C., Erosheva, E. & Menardi, G. (2021)  
*Co-clustering of time-dependent data via the Shape Invariant Model*  
Journal of Classification, 38(3), 626–649
- Frizzarin, M., O’Callaghan, T.F., Murphy, T.B., Hennessy, D. & **Casa, A.** (2021)  
*Application of machine learning methods to milk mid infrared spectra for discrimination of cows milk from pasture or TMR diets*  
Journal of Dairy Science, 104(12), 12394–12402
- Frizzarin, M., Gormley, I.C., Berry, D.P., Murphy, T.B., **Casa, A.**, Lynch, A. & McParland, S. (2021)  
*Predicting dairy cow milk quality traits from routinely available milk spectra using statistical machine learning methods.*  
Journal of Dairy Science 104(7), 7438–7447
- **Casa, A.**, Scrucca, L. & Menardi, G. (2021).  
*Better than the best? Answers via model ensemble in density-based clustering.*  
Advances in Data Analysis and Classification 15(3), 599–623
- **Casa, A.**, Chacón, J.E. & Menardi, G. (2020)  
*Modal clustering asymptotics with applications to bandwidth selection.*  
Electronic Journal of Statistics 14(1), 835–856
- **Casa, A.** (2018)  
*On the choice of the weight function for the integrated likelihood.*  
SM Journal of Biometrics & Biostatistics, 3(3), 1033

## Discussions

- **Casa, A.**, Fop, M. & Murphy, T.B. (2021)  
*Contributed discussion on: “Centered partition processes; informative priors for clustering” by Paganin, S., Herring, A.H., Olshan, A.F. & Dunson, D.B.*  
Bayesian Analysis 16(1), 301–370

## Book chapters

- **Casa, A.**, Cappozzo, A. & Fop, M. (2023).  
*Penalized Model-Based Clustering with Group-Dependent Shrinkage Estimation.*  
In: Building Bridges between Soft and Statistical Methodologies for Data Science.  
SMPS 2022. Advances in Intelligent Systems and Computing, vol 1433. Springer.  
[https://doi.org/10.1007/978-3-031-15509-3\\_10](https://doi.org/10.1007/978-3-031-15509-3_10)
- Cabassi, A., **Casa, A.**, Farcomeni, A., Fontana, M., Russo, M. (2018).  
*Three testing perspectives on connectome data.*  
Studies in Neural Data Science, Springer Volume 'Proceedings in Mathematics & Statistics', ISBN-9783030000394.

### Monographs

- **Casa, A.** (2020) Climbing modes and exploring mixtures: a journey in density-based clustering. PhD Thesis, University of Padova

### Refereed conference proceedings

- **Casa, A.**, Murphy, T.B. & Fop, M. (2024)  
*Sparse partial membership models with applications in food science*  
Soon to appear in: Methodological and Applied Statistics and Demography - SIS 2024 Short Papers, ISSN: 3049-2135
- Gardella, J., Carone, R., Ciarulli, S., Francescon, N., Freddi, M., Garlanda, E., **Casa, A.** & Pini, A. (2024)  
*Bayesian models for registration of functional data*  
Soon to appear in: Methodological and Applied Statistics and Demography - SIS 2024 Short Papers, ISSN: 3049-2135
- **Casa, A.**, Murphy, T.B. & Fop, M. (2023)  
*Partial membership models for high-dimensional spectroscopy data*  
CLADAG 2023 - Book of Abstracts and Short Papers. ISBN: 9788891935632
- **Casa, A.**, O'Callaghan, T.F. & Murphy, T.B. (2022)  
*Unveiling patterns in spectroscopy data via a Bayesian latent variables approach*  
Book of Abstracts, CFE-CMStatistics 2022, ISBN 978-9925-7812-6-3
- **Casa, A.**, Scrucca, L. & Menardi, G. (2022)  
*Model ensemble in density-based clustering*  
Programme and Abstracts, 24th International Conference on Computational Statistics (COMPSTAT 2022), ISBN 978-90-73592-40-7
- **Casa, A.**, Bouveyron, C., Erosheva, E. & Menardi, G. (2021)  
*Model-based co-clustering of multivariate time-dependent data*  
Book of Abstract, CFE-CMStatistics 2021, ISBN 978-9925-7812-5-6
- Cappozzo, A., **Casa, A.** & Fop, M. (2021)  
*Model-based clustering with sparse matrix mixture models.*  
CLADAG 2021 - Book of abstract and short papers.  
DOI: 10.36253/978-88-5518-340-6
- Cappozzo, A., **Casa, A.** & Fop, M. (2021)  
*Penalized model-based clustering for three-way data structures.*  
Book of short papers - SIS 2021. ISBN 9788891927361
- **Casa, A.**, O'Callaghan, T.F. & Murphy, T.B. (2021)  
*Parsimonious modelling of spectroscopy data via a Bayesian latent variables approach.*  
Book of short papers - SIS 2021. ISBN 9788891927361
- **Casa, A.**, Chacòn, J.E. & Menardi, G. (2019)  
*Asymptotics for bandwidth selection in nonparametric clustering.*  
Cladag 2019 - Book of short papers. ISBN 9788883171086
- **Casa, A.** & Menardi, G. (2019)  
*Nonparametric semisupervised classification and variable selection for new physics searches.*  
EMS 2019 - Program and Book of Abstracts.



- Pascali, G., **Casa, A.** & Menardi, G. (2019)  
*Co-clustering TripAdvisor data for personalized recommendations.*  
Book of short Papers SIS 2019. ISBN 978889191510.
- **Casa, A.**, Scrucca, L. & Menardi, G. (2018)  
*Averaging via stacking in model-based clustering.*  
Book of abstracts of the 4th International Workshop on Model-Based Clustering and Classification (MBC2)
- **Casa, A.**, Scrucca, L. & Menardi, G. (2018)  
*On the selection uncertainty in parametric clustering.*  
Book of abstracts of the European Conference on Data Analysis (ECDA)
- **Casa, A.**, Chacòn, J.E. & Menardi, G. (2018)  
*On the choice of an appropriate bandwidth for modal clustering.*  
Book of short Papers SIS 2018. ISBN 9788891910233
- **Casa, A.**, Chacòn, J.E. & Menardi, G. (2018)  
*Clustering-oriented selection of the amount of smoothing in kernel density estimation.*  
Book of abstracts - ISNPS 2018. ISBN 9788861970 007
- **Casa, A.** & Menardi, G. (2017)  
*Signal detection in high energy physics via a semisupervised nonparametric approach.*  
Proceedings of the Conference of the Italian Statistical Society "Statistics and Data Sciences: new challenges, new generations". ISBN 9788864535210
- **Casa, A.** & Menardi, G. (2017)  
*Nonparametric semi-supervised classification with application to signal detection in high energy physics.*  
Books of abstracts of the International Federation of Classification Societies (IFCS)